



Department  
of Energy &  
Climate Change

## Understanding the Pathways to and Impacts of a 1.5 °C Rise in Global Temperature

### Announcement of Opportunity

#### Summary

The Natural Environment Research Council (NERC) and Department for Energy and Climate Change (DECC) invite proposals for a new £700k collaborative research programme on 'Understanding the Pathways to and Impacts of a 1.5 °C Rise in Global Temperature'. The programme aims to undertake research to address the novel national and international research needs arising from the Paris Agreement to '*strengthen the global response to the threat of climate change.... and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels....*'

Three potential science areas have been identified for research in this area.

- i. **Linkage between the cumulative level of net emissions of greenhouse gases and future temperature increases in the 1.5-2.0 °C range.**
- ii. **Feasibility of pathway options that limit warming to 1.5 °C and their additional consequences.**
- iii. **Environmental impacts of a 1.5 °C temperature rise compared with 2 °C.**

Up to £700k is available for this call. The programme will support up to seven small projects of a maximum of £100k each (80% FEC) and up to 12 months' duration.

Funded projects will build on the outcomes of the [AVOID2 programme](#) and similar studies.

Proposals for this call are invited from eligible UK researchers (see [NERC Grants Handbook](#) for standard eligibility criteria). Given the relatively short duration of this programme, applicants must be able to show a proven track record in this area of work.

**Proposals must be submitted via the UK Research Councils' Joint Electronic Submission (Je-S) system before 16:00 GMT/UTC on 18 August 2016.**

### 1. Background

At the 21<sup>st</sup> Conference of Parties of the UN Framework Convention on Climate Change (UNFCCC) in Paris in December 2015 (COP21), 195 countries, including the world's largest emitters, agreed to strengthen the global response to the threat of climate change partly by agreeing to hold the increase in global average temperature to well below 2 °C above pre-industrial levels, and pursue efforts to limit the temperature increase to 1.5 °C.

The Paris agreement also invited the Intergovernmental Panel on Climate Change (IPCC) to produce a special report in 2018 on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways. The IPCC has now agreed to produce this report. Currently,

our science understanding on a 1.5 °C global temperature rise is less robust than for the 2 °C warming limit, but there appear to be environmentally (and economically) important thresholds within that range<sup>1</sup>. There are very few modelled scenarios in the IPCC AR5 database that restrict warming to below 1.5 °C during the entire twenty-first century<sup>2</sup> and those that do are heavily reliant on negative emissions (greenhouse gas removal), beginning as early as within the next 5 years. The feasibility of such approaches at the scale required is highly uncertain, even for the 2 °C<sup>3</sup> limit.

## 2. Programme Objectives

NERC and DECC have come together to fund a Joint Strategic Response research programme on this topic to inform UK policy in this area.

The aim of this research programme is to advance our understanding of the research needs and provide timely evidence to inform policy following the introduction of the 1.5 °C limit in the Paris agreement. To enable this aim to be achieved, NERC and DECC will be looking for projects with pathways to impact that provide at least one of the following:

- Evidence for the UK Committee on Climate Change, with regard to their statutory advice on national carbon budgets;
- Input to the IPCC special report on this subject, which is expected to have a publication submission deadline in late 2017 or early 2018. This Special Report will be developed under the joint scientific leadership of Working Groups I, II and III with support from WGI TSU.

Applicants should note that UK and Indian representatives co-chair the IPCC Working Group III on mitigation and DECC financially supports the Technical Support Unit (TSU) delivering this aspect of the 6th Assessment Report for the Working Group. Projects will be expected to work closely with DECC and the IPCC Working Groups to ensure that the outcomes of the research contribute to policy development.

Three key science areas have been identified for research:

**a. Linkage between the cumulative level of net emissions of greenhouse gases and future temperature increases in the 1.5-2.0 °C range**

- Further development of climate models to reduce uncertainties regarding the maximum cumulative CO<sub>2</sub>-equivalent emissions if the 1.5 °C limit is not to be exceeded. This will involve the inclusion of post-AR5 parameterizations of processes affecting temperature sensitivity for radiative forcing
- Investigation of the potential impact of changing emissions of other radiatively-active gases and particles, including tropospheric pollutants that currently exert a cooling effect, on the cumulative emissions that result in temperature increases in the 1.5-2.0°C range

**b. Feasibility of committed pathway options that limit warming to 1.5 °C, and their additional consequences.**

- Improved understanding of the scale of negative emission technologies (greenhouse gas removal), and the timing for their introduction, needed in pathways that achieve a 1.5 °C limit to warming (noting that more detailed studies on negative emissions will be supported by the new [Greenhouse Gas Removal programme](#), with the expectation that linkages will be developed as and when appropriate)

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<sup>1</sup> Ricke et al (2016) *Nature Geoscience* 9, 5-6

<sup>2</sup> Rogelj et al (2015) *Nature Climate Change* 5, 519-27

<sup>3</sup> Williamson (2016) *Nature* 530, 153-155

- Exploration of risk of slow-onset climate change impacts (e.g. sea level rise, ocean acidification, changes in biodiversity ecosystems) and threshold effects (e.g. Arctic methane release) across a range of temperature rises (1.5 °C – 2.5 °C). Also, investigation of the impacts in the case of an overshoot in temperature or atmospheric levels of greenhouse gases that are subsequently reduced by active removal
- c. **Environmental impacts of a 1.5 °C temperature rise compared with 2 °C, to include assessment of changes in:**
- Regional patterns of projected climate impacts over that temperature range, with associated potential consequences for agricultural production
  - Frequency and intensity of extreme weather events over that temperature range
  - Impacts on temperature-sensitive ecosystems such as the polar regions, high mountains and the tropics, with potential for critical thresholds and irreversible change
  - Impacts on the pace and long-term consequences for sea level rise
  - Ocean acidification and its impacts, over the range 400-450 ppm CO<sub>2</sub>

The funders expect proposals to address a subset of the issues identified above, recognizing that it may not be feasible for all topics to be addressed, and will look to fund a balanced portfolio of projects which cumulatively address all three science areas.

Although the focus here is on 1.5-2.0 °C, it is appreciated that for some studies a hard limit of 2°C may not be appropriate, for example some pathways may just miss the 2°C target. As such, the upper limit is not a fixed value and studies that also look beyond 2°C (i.e. up to 2.5°C) will be considered for funding.

**Given the need to provide timely evidence for policy development applicants must be able to show a track record in this area of work and set out how they will ensure that the research will be completed in time to contribute to the IPCC special report.**

Proposals will not go out to external peer review but will be reviewed by an assessment panel with relevant expertise.

### 3. Proposal Requirements

#### 3.1 Programme Scope

The 'Understanding the Pathways to and Impacts of a 1.5 °C Rise in Global Temperature' programme will support up to seven small projects undertaking research to advance our understanding of this topic to address research needs and inform policy.

This programme has been designed to enable the research community to contribute evidence towards future policy on the internationally-agreed long-term global temperature goal, and to contribute to the IPCC special report on 1.5°C and inform the work of the UK Committee on Climate Change. **The research should therefore be new and transformative, as the opportunity to undertake the research and contribute into policy discussions will be short-lived.** It is expected that successful projects will provide evidence of scenarios restricting warming to below 1.5 °C and detail the environmental and economic impacts.

#### 3.2 Eligible Research Organisations

This opportunity is open to individuals and organisations eligible for NERC research grant funding, i.e. applicants in UK Higher Education Institutions (HEIs), NERC Research and Collaborative Centres, and

Independent Research Organisations (IROs) approved by NERC for managed mode ([RCUK eligibility for Research Council funding](#)). Please refer to the [NERC Grants Handbook](#) for details.

Potential applicants should contact NERC well in advance of the submission deadline if they have any queries concerning their eligibility.

### 3.3 Research Roles and Eligibility

With the exception of project partners and 'staff' such as researchers and technicians, **individuals may be named on a maximum of two Grants submitted, and may be named as a lead Principal Investigator (PI) on only one.** The total time commitment across the applications with which they are involved should not exceed 100%. If individuals are named on more than two submitted proposals then additional proposals will be rejected.

Full information on individual eligibility and role descriptions can be found under Section C of the [NERC Grants Handbook](#).

### 3.4. Associated Studentships on a Proposal

Associated studentships (either Masters or PhD studentships) cannot be included on proposals submitted to this programme.

### 3.5. Demonstrating the Pathway to Impact

The projects are expected to deliver both academic impact (for example research papers, significant new models/data and understanding) and a pathway to significant policy impact in order to contribute to a central goal of both NERC and DECC; excellence with impact.

An acceptable Pathway to Impact is required before a grant may start. A clearly articulated demand for the proposed research is expected. The Pathways to Impact strategy is expected to identify target beneficiaries from the proposed research over different timescales, how they will benefit and what actions will be taken within the project to increase the likelihood of the research reaching the identified beneficiaries and maximise the likelihood of the identified benefits being achieved. This should include reference to the specific objectives and outputs of this programme.

NERC has several resources available to support the development of Pathways to Impact including:

- [NERC Pathways to Impact Policy and Guidance](#)
- [RCUK Pathways to Impact Guidance](#).

### 3.6 Data policy

NERC and DECC require that all funded projects implement a data management scheme which covers practical arrangements during the project and subsequent long-term availability of the data sets. In line with NERC and DECC's data policies the data from the projects will be lodged with the appropriate NERC Designated Data Centre or other appropriate publically available data repositories.

NERC and DECC put an obligation upon PIs to ensure that data management is undertaken in a suitable way. Applicants are required to submit an Outline Data Management Plan (ODMP), to identify the data sets likely to be available for archiving and reuse at the end of the grant. There will be no charge to the project for a NERC Data Centre to accept and manage the agreed data sets at the end of the grant but any in-project data management activities should be costed and included within the proposals. If proposals do include any costs for the Data Centre then these will be removed from the proposal. Further information is provided on the NERC [data management planning webpages](#).

All relevant data sets suitable for long-term preservation should be lodged with the appropriate data centre by the end of the project. It is expected that all data sets lodged with the data centres will be openly available for use by anybody without any restrictions as soon as the project has completed. Requests to restrict access to the data beyond the end of the project must be discussed with, and approved by, the funders.

NERC has recently adopted new policies on open access publication. It is now required that all publications be open access. It is expected that all academic journal publications be open access (gold or green), and where possible this should include book and book chapters. Further information is available from the [RCUK Open Access Policy](#).

#### **4. Application Process**

The 'Understanding the Pathways to and Impacts of a 1.5 °C Rise in Global Temperature' programme call will **provide funding of up to £100k (80% FEC) for a maximum duration of 12 months. It is a requirement of the funding that the projects start no later than 31 October 2016.**

Funding contributions will be 80% of the FEC incurred to undertake the project, including overheads and any NERC facility costs. Any applications with an overall cost to the funders over £100k will be automatically rejected. This call has been allocated a total budget of £700k which may be revised at the discretion of the funders.

**Proposals must be submitted via the UK Research Councils' Joint Electronic Submission (Je-S) system before 16:00 GMT/UTC on 18 August 2016.**

Applicants may submit their proposal as a single Je-S application only. Joint applications are not allowed for this call.

This call will award funds to the lead institution named on each application, which will then be responsible for disbursing funds to other institutions/organisations named on that application.

In order to prepare a Je-S proposal submission the person preparing the proposal has to create a new proposal. The process for this is as follows:

- On logging into Je-S select the Research Council – NERC
- Select the Document type 'Standard Proposal'
- Select Scheme – 'Directed'
- Select call "Understanding the Pathways to and Impacts of a 1.5 degree Rise in Global Temperature"

All applications must be submitted in English and costed in pounds sterling (£/GBP)

**All documents (including embedded references) should be completed in single-spaced typescript of minimum font size 11 point Arial font or other sans serif typeface of equivalent size to Arial 11, with margins of at least 2 cm. Please note that Times New Roman, Arial narrow and Calibri are not allowable font types as they are smaller and any proposal which has used either of these font types within their submission will be rejected. Applicants referring to websites should note that referees may choose not to use them. Page limit restrictions apply and should be adhered to. Failure to adhere to these guidelines will result in rejection of your application.**

**Please note that on submission to council ALL non-PDF documents are converted to PDF, and the use of non-standard fonts may result in errors or font conversion, which could affect the overall length of the document. Additionally, where non-standard fonts are present, and even if the converted PDF**

document may look unaffected in the Je-S System, when it is imported into the Research Councils Grants System some information may be removed. We therefore recommend that where a document contains any non-standard fonts (scientific notation, diagrams, etc), the document should be converted to PDF prior to attaching it to the proposal.

**Applicants should ensure that their proposal conforms to all eligibility and submission rules; otherwise their proposal may be rejected without peer review.** More details on NERC's submission rules can be found in the [NERC research grant and fellowships handbook](#) and in the [submission rules](#) on the NERC website.

#### 4.1 Documents required

The grant application will comprise a Je-S pro-forma and a number of attachments - case for support, data management plan, justification of resources, pathways to impact, CVs, letters of support, and, if applicable, facilities application forms. Details of what is required in each document are given in this section.

The **Je-S pro-forma** has a series of sections that need to be completed:

- Title of the proposal
- Objectives
- Summary
- Academic Beneficiaries
- Nominated referees
- Project Partners
- Letters of Support from Project Partners

The **Case for Support** is comprised of two parts:

- a. Previous Track Record – up to 2 sides of A4
- b. Description of Proposed Research – up to 4 sides of A4

Particular attention will be paid to the previous track record for this call. Applicants must be able to show a track record of research in this area of work.

The Previous Track Record should be a maximum of 2 sides of A4 and include a brief outline of the organisations involved in the project and address the following aspects:

- Describe the nature of the organisations named (i.e. university, research institute, etc)
- Importantly, the track record should concentrate on the key named individuals/researchers, their role in the project and details of relevant experience and how they are best suited to conduct the research proposed within the described timescale. You may also wish to include details of any external funding held for key individuals and their organisations
- Indicate where your previous work has contributed to progressing the field of research, and/or providing impact, evidenced by including the top 3 – 5 relevant publications per PI and Co-I.
- Outline the specific expertise available for the research at the host organisation and that of any associated organisations and beneficiaries

The Description of the Proposed Research should be a maximum of 4 sides of A4. The Description of Proposed Research contains the substance of the research application. It is essential that a coherent exposition of the proposed project is presented. The Description of Proposed Research should address the following points:

- Underlying rationale, scientific, technological and developmental issues to be addressed
- Specific objectives, hypotheses and research questions of the project, including their potential relevance to global research work in the field, relevance to the programme aims, and anticipated

- achievements and outputs
- Methodology and approach; this should include methods and location of data collection, and details on the use and manipulation of data
- How the proposed research addresses the programme aims, i.e. providing:
  - Evidence for the UK Committee on Climate Change, with regard to their statutory advice on national carbon budgets;
  - Input to the proposed IPCC special report, which is expected to have a publication submission deadline in late 2017 or early 2018.
- A summary of the expected outputs of the research with evidence that the outputs can realistically be achieved within the timeframe of the programme
- Programme and/or plan of research

**Data Management Plan** – up to 1 page of A4. This plan should include information about how the project will manage the data produced. It must identify the datasets that the research will produce and which will be of potential long-term value and which the NERC data centres will need to manage and make available to enable re-use after the end of the research.

**Justification of Resources** requested – up to 2 sides of A4. This should state the full cost of the project and explain why the requested resources are needed, including identifying why the proposal presents value for money. It should include a justification for all Directly Incurred Costs, Investigator effort, use of pool staff resources and any access to shared facilities and equipment being sought. No justification of Directly Allocated Estates and Indirect Costs is required. Please note that budgets may be reduced if considered excessive.

**Pathways to Impact** attachment – up to 2 sides of A4. The ‘Pathways to Impact’ describes how the proposed work will achieve impact and build capacity. Guidance on demonstrating a pathway to impact is given in Section 3.5.

A **Curriculum Vitae (CV)** for all named research staff: PIs, Co-Is, Researcher Co-Is, named Researchers and Visiting Researchers (up to 2 sides of A4 for each CV).

**Letters of support** from any project partners – up to 2 sides of A4 each. Each Project Partner must provide a detailed signed letter of support of up to 2 sides of A4. The letter of support should confirm the organisation’s commitment to the proposed project, identify the value, relevance and possible benefits of the proposed work to the partner, the period of support, the full nature of the collaboration and how the partner will be involved in the project and provide added value. Partner contributions, whether in cash or in kind, should be explained in detail in the case for support, including the equivalent value of any in-kind contributions. The letter should be written when the proposal is being prepared and targeted specifically to the project.

#### **Application forms for any NERC Facilities**

Applicants may also apply for access to any of the [RCUK services and facilities](#). Prior to submitting the proposal, applicants must first contact the facility to seek agreement that they could provide the service required and obtain a technical assessment (quote). Applicants should contact the relevant facility well in advance of the closing date to ensure that the facility can provide the quote in time to be submitted with the proposal. Applicants should refer to the point 219 of the [NERC Grants Handbook](#) for further detail. **The cost of the facility must be included under other DI and be included within the £100k maximum budget.**

Applicants must also state on the Je-S form that access to Research Council Facilities will be required. This is situated within the section ‘Summary of Resources Required for Project’ where there is an option to select ‘Add New Research Facility’. If ARCHER and/or MONSooN/RDF/JASMIN (as applicable) are selected an option to describe ‘Proposed Usage’ will appear. Please state in the free text box at this point if the HPC form is submitted (>160 MAU in any one year).

## 4.2 Project Finances

The financial cost of the project should be identified in the following components of the application:

- Je-S pro-forma
- Justification of Resources document

See section 4.1 for further details of the information required in each of these components.

**All applicants are advised to consult their institutional finance officers when completing the financial parts of the application.**

All applicants should enter the 100% full economic costs of the proposed research into the budget sections of the Je-S form. Any applications with an overall cost to the funders of over £100k– including facilities cost – will be rejected. All costs should be in pounds sterling (£).

All costs associated with the project must be itemised in the Je-S proforma and justified in the Justification of Resources document.

## 5. Assessment Process

An Assessment Panel comprised of independent experts will review, grade and rank the proposals.

The recommendations of the Panel will provide the basis for the funding decision by NERC and DECC. Note that the funders will be seeking to support up to seven projects and will consider the overall balance of research needed to address the programme's aims in making decisions about which grants to fund.

The [assessment criteria](#), which have equal weighting, are:

- Science Excellence; and
- Fit to Scheme

The Science Excellence criteria relates to the originality and quality of the proposed research and the importance of the questions being addressed.

The Fit to Scheme criteria relates to the degree to which the proposed research addresses the objectives of the programme. **Additionally, given that one of the aims of this research is to feed into the next phase of the IPCC process, applicants should set out how they will meet this deadline.**

The focus of the programme is on the production of models which assess the feasibility and conditions required to meet the 1.5 °C limit on global warming using methods which are novel, timely and urgent, and that cannot be supported through other funding routes. Applicants should also explicitly address how the research meets this requirement of the programme in their proposal.

Applicants will be given feedback from the Panel summarising the reasons why the proposal was successful/unsuccessful. No further feedback will be available.

## 6. Post Award Management

Representatives from all the funded projects will be expected to attend a programme kick-off meeting in November 2016 (date and venue tbc). This meeting will provide an opportunity for the project teams to meet each other, gain an overview of the funded research and initiate project engagement with DECC to

ensure that the outcomes of the research contribute to policy development.

Each project will also be expected to produce a short final report, and may be required to respond to other ad hoc queries for information from NERC and DECC.

## 7. Timeline

- July 2016 - Announcement of Opportunity
- 18 August 2016 - Closing date for proposals
- w/c 19 September 2016 - Assessment Panel
- Early October 2016 - Award letter issued
- October 2016 - Projects start
- Early November 2016 – Kick-off meeting

**All grants must start on or before 31 October 2016.**

## 8. Queries

All queries should be directed to the programme secretariat at [atmospheric@nerc.ac.uk](mailto:atmospheric@nerc.ac.uk)